

Arjun Vaithilingam Sudhakar

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EDUCATION

- **Polytechnique Montréal, Mila - Quebec AI Institute** Montreal, Quebec, Canada
Doctor of Philosophy - Computer Science - Machine Learning Specialization August* 2022 - 2026
Supervisor: Prof.Sarath Chandar
Research Interest: • Interactive Learning • Language Models • Reinforcement Learning
- **University of Montreal, Mila - Quebec AI Institute** Montreal, Quebec, Canada
Master of Science - Computer Science - Machine Learning Specialization August 2020 - 2022
Mentors: Prof.Sarath Chandar, Dr.Prasanna Parthasarathi
Courses: Representation Learning, Reinforcement Learning, Machine learning, Advanced Projects in Machine Learning, Data Science, Neural Scaling Law
- **Anna University, RMD Engineering College** India
Bachelor of Technology - Information Technology August 2013 - 2017
Courses: Artificial Intelligence, Database Management System, Data Structures, Analysis Of Algorithms, Software Engineering

SKILLS SUMMARY

- **Technical Skills:** Python, Pytorch, Tensorflow, SQL, Numpy, Pandas, Wandb, Seaborn, LaTeX, Linux
- **Soft Skills:** Leadership, Event Management, Public Speaking, Time Management

EXPERIENCE

- **Mila - Quebec AI Institute, Chandar Lab** August 2021 - August 2022
Research Assistant (Full Time)
 - **Language Model as Task Solver** - Developed language models (GPT-2) incorporating human gameplay, linguistic priors, and improved action candidates based on game history.
 - **Feature Diversity in Self-Supervised Algorithm** - Investigated factors promoting feature diversity in CNN components of Self-Supervised Algorithms. Our findings indicated that diversity is proportional to the width of the model.
 - **Interactive Learning in Text-Based Games Using Reinforcement Learning** - Implemented Reinforcement Learning to learn optimal Q-values using DQN, where the action space was defined by sentences in natural language.
- **Hydro Quebec, Montreal, Quebec** May 2021 - January 2022
AI Research Intern (Full Time(May - Aug), Part Time(Sep - Jan))
 - Conducted a comprehensive review of literature and carried out proof of concept and feasibility studies on 3D Object Detection and Video Object Detection for Autonomous Vehicles.
 - Implemented both OpenCV and CNN Model approaches for Dial Inspection, cross-verifying the outputs for reliability.
 - Achieved a test set accuracy of around 95% by utilizing techniques such as synthetic data generation, pre-processing, data augmentation, dropouts, model optimization, and careful hyperparameter tuning.
- **Wipro Technologies, India** October 2017 - July 2020
Machine Learning Engineer(Full Time)
 - With Metrics Beats installed on the server, data was collected from each server's CPU, memory, disk, and network to predict time ahead and prevent server failure.
 - Data was collected at second intervals and was aggregated to minutes with 45 days of data to predict 1 day ahead, yielding 64,800 records for a single server.
 - We conducted experiments with various hyperparameters, including epochs, neurons, batch size, number of LSTM layers, and drop out percentage, to determine the most appropriate values for our business problem. We then performed anomaly prediction based on the SME's threshold, resulting in an average accuracy of 81% on the test set.

PROJECTS

- **Voice Activity Detection-Speech Brain.** [link] Packages: Pytorch, SpeechBrain toolkit
 - I focused on developing a speech activity detection system. The system was designed to process input waveforms and accurately identify speech segments from background noises.
 - To effectively handle long recordings, I developed a preprocessing script that divided the recordings into multiple overlapping chunks and combined the results.
 - Through careful tuning of hyper-parameters, I was able to achieve a test F-Score of 0.94, which matches the state of the art.
- **Built 10 Machine/Deep Learning Algorithms from Scratch** [link] Packages: Numpy, Pandas, Seaborn
 - Implemented machine learning algorithms including Linear Regression variants, Logistic Regression, Naive Bayes, KNN, PCA, SVC, and Neural Networks from scratch using NumPy and Pandas to gain a deeper understanding of the underlying intuition and mechanics of gradient descent.

PUBLICATIONS

- Pranshu Malviya*, **Arjun Vaithilingam Sudhakar***, *Feature Diversity in Self Supervised Learning*, Conference on Lifelong Learning Agents-Workshop 2022 [link]

ACADEMIC SERVICES

- **Lab Manager, Chandar Research Lab, Mila - Quebec AI Institute** August 2021 - Present
Responsibilities: Management, students onboarding, proposal writing
 - I was responsible for overseeing the entire proposal process and provided support in writing two proposals (Google teaching proposal and CIFAR). My efforts ensured that the proposals were submitted and approved successfully for the lab. Also, introduced systems to improve the quality of the lab functioning.
 - Formed a web development team through outsourcing, which resulted in saving research time for students and increased the lab's public visibility through high-quality websites at a reduced cost.
- **Toastmasters International (Nonprofit Educational Organization)** April 2018 - Present
Responsibilities: Peer-to-Peer Learning, Public Speaking, Leadership
 - **Associate Area Director:** I led a team of 150+ members across corporate and college clubs in District 92 of Toastmasters International. This role involved managing multiple business units across different locations and geographies. I also successfully persuaded a CXO to implement a \$25,000 USD per year membership reimbursement program (pilot) across Wipro.
 - **Associate President** I was able to increase the club strength from 4 to 40 members in less than a year. Additionally, I organized the 250th Meeting Milestone event with a 100+ audience and conducted club contests for public speaking.
- **Teaching Assistant, AI4Good (Nonprofit Organization)** June 2022 - July 2022
Responsibilities: Mentoring, Teaching, Creating Learning Material, Office Hours
 - As part of the program, I had the opportunity to guide and mentor underprivileged female students in the field of Machine Learning and Deep Learning. I taught a range of supplementary materials, including mathematics, machine learning, deep learning, and reinforcement learning.
 - Additionally, I mentored a capstone project on the development of an "Emotive Application," which aimed to capture mental health information using both Machine and Deep Learning techniques over a period of four weeks
- **Teaching Assistant, INF8245E - Machine Learning** Sept 2021 - December 2021
Responsibilities: Assignment Preparation, Teaching, Creating Material, Office Hours
 - "I proposed the idea of providing Math and Python tutorials for students to brush up on prerequisites. I created from scratch Linear Algebra and Scikit tutorials and delivered them to the class students.
 - In addition to teaching and grading, I kept the website, and YouTube lectures up to date. I continuously monitored student feedback to improve the course by introducing auto-grading."

SCHOLORSHIP

- Awarded the AI Week 2022 Student Travel Bursary worth CAD \$1500
- Mila-Quebec AI Institute Graduate Funding (2022-2026) [Value: \$ 27,000 CAD per year]
- Ecole Polytechnique-Exemption Scholarship (2022-2026) [Value: \$ 17,000 CAD per year]
- Microsoft Diversity Award (2021) [Value: \$4,000 CAD]
- University of Montreal-Exemption Scholarship (2020-2022)[Value: \$9,500 CAD per year]

TECHNICAL TALKS

- *Learning Representation*-Amrita Vishwa Vidyapeetham, Engineering College, India-2023
- *Learning Representation*-Bishop Heber College Engineering College, India-2023
- *Neural Networks*-Rajalakshi Engineering College, India-2020
- *Machine Learning Projects*-Bishop Heber College-2020
- *Machine Learning*-RMD Engineering College-2020
- *Linear Algebra*-Bishop Heber College, India-2019

HONORS AND AWARDS

- Received the *Best Student Award*-2016 by the Indian Society of Technical Education (ISTE)
- Received Cognizant-*Best Project Award* 2017
- *Innovation Award*-2016 by Innovation and Entrepreneurship Development Cell (IEDC)-Government Of India
- Chief Judge in Design Thinking Contest-Rajalakshmi Engineering College (2019)